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REMINISCENCES OF ALASKAN VOLCANOS¹

By WILLIAM HEALEY DALL

SMITHSONIAN INSTITUTION

THE first author to take up the subject of Alaskan volcanos systematically was Constantine Grewingk in 1850.² He gathered from all previous accessible sources such data as existed on record, and his work is the classical source of such information. Later Tikhmenieff in his "History of the Russian-American Company"³ added such supplementary reports as had been obtained by the navigators of the company's fleet on the Alaskan coast. The more important of these observations were incorporated in the chapters on Geology and History of my "Alaska and its Resources"⁴ in 1870. Now that the national Geographic Society has taken up the subject of Alaskan Volcanos it seems well to put on record the scattered observations which I had been able to make during my field work for the U. S. Coast Survey, 1871 to 1880, and for the U. S. Geological Survey, 1885 to 1899.

The southernmost volcano of the Alaskan coast was named by Vancouver Mt. Calder and was regarded by him as a conspicuous peak about five thousand feet high. Later observers have found difficulty in identifying it among the other peaks of the northern part of Prince of Wales Island, and if really a volcano, it appears to be extinct and has perhaps lost in height since Vancouver's time.

The best known of Alaskan volcanos is Mount Edgecumbe on the northwest side of Sitka Sound rising from Kruzoff Island, and a most conspicuous object for navigators. It was named by Cook in 1778, after the well-known elevation on the south coast of England. It is a low flat-topped mountain with gentle slopes, the summit occupied by a crater some two thousand feet in diameter, the edge of which rises to a height of 2,855 feet according to observations by Davidson in 1867. From the summit deep gorges radiate which give rise to an equal number of torrents, and which remain filled with snow after the latter has melted from the intervening prominences of reddish volcanic material. The result is a very striking radiately striped cone of white and red, which once seen is never

¹ Published by permission of the Director of the U. S. Geological Survey.

² Beitr. zur Kenntniss der Nordwest-Küste Amerikas, mit den anliegenden Inseln." St. Petersburg, Karl Kray, 1850, 1 vol. 8°.

³ St. Petersburg, E. Weimar, 1861-3; 2 vols. 8°, in Russian.

⁴ Boston, Lee and Shepard, 1870, 1 vol. 8°.

forgotten. It is said to have emitted smoke in 1796, but this is the only record of activity in historic times. It is associated with Indian legend as the home of the mythical "Thunderbird" from whence that monster issued to prey on whales. It has been many times ascended by Russian parties, as well as by Davidson in 1867, and a party from the Western Union Telegraph Expedition in 1865.

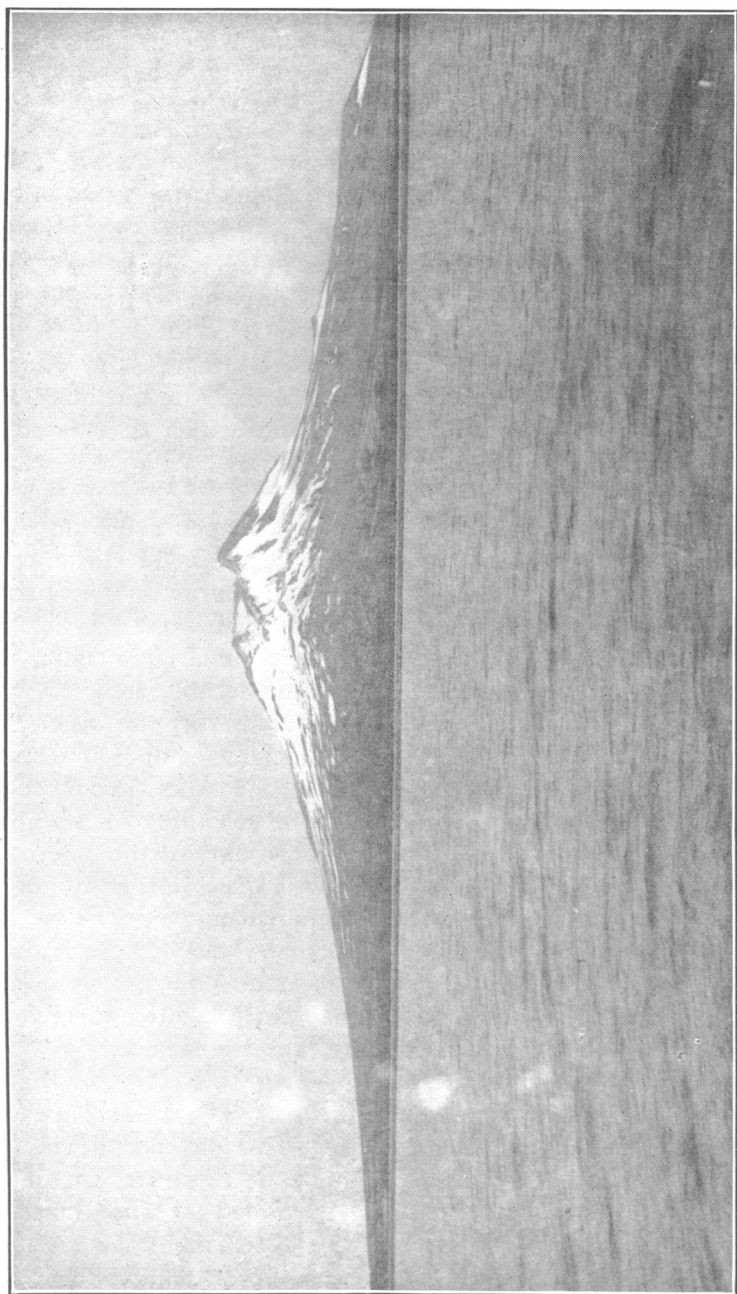
Various high mountain peaks of the St. Elias Range have been at times regarded as volcanic and the trail of mist which frequently projects from the lee side of such peaks has been taken for steam, but later observations have shown these views to be erroneous.

The high mountains, including the St. Elias and Alaska ranges, which are arched about the Gulf of Alaska, have as a keystone the only volcano in the territory which is situated at any great distance from the sea; namely Mt. Wrangell⁵ which still maintains an intermittent activity.

The long line described by the Alaska peninsula and the Aleutian Islands, marking a line of weakness in the earth's crust through which plutonic forces have operated since Jurassic times, affords a splendid field of volcanic activity. Two classes of volcanos are in evidence in it: one comprising the typical volcanic cones rising to a considerable height, with evenly sloping sides and snowcapped summits; the other low and wide craters. The former are largely composed of volcanic ash and cinders, the latter of basaltic lavas. Beside these there are massive eruptions consisting of volcanic rock, syenitic, andesitic or porphyritic, of which a large part of the islands is composed. In the entrance to Sanborn harbor in the Shumagin Islands, the syenitic rock is seen penetrating from below the crevices in an arch of the Mesozoic schists, and in 1871 I found in the central ridge of the island of Unalashka a core of the same material. This observation has since been confirmed by the researches of Professor Jaggar, and pebbles of the same rock were collected in 1895 by Dr. George F. Becker, of the U. S. Geological Survey, at Iliuliuk Harbor. The greater part of the rocks of Unalashka Island are eruptive clay porphyries.

Two of the most striking peaks in the territory are found on the western side of Cook Inlet, named by the Russians Iliamna and Redoubt mountains, the latter from the fortified post on the Kenai peninsula opposite. In 1895, with Dr.

⁵ Baron von Wrangell, formerly governor of Russian America, well known for his scientific publications and explorations, spelled the last syllable of his name with a double "l," which accordingly should be retained in the cases of the geographical features named for him.



ST. AUGUSTINE, OR CHERNABURA, VOLCANO, COOK'S INLET, ALASKA, from the S.S.W. twenty miles distant. July, 1895.

Becker, we entered Tuxedni harbor near the foot of Iliamna. Here the shores rise abruptly, some thousands of feet of Mesozoic limestones wonderfully carved by the weather into turrets, castellated crags, and grand cathedral arches, which in the clear gray twilight of an Alaskan summer night presented a sublime spectacle. The depth of water is very great and we anchored with difficulty close to the shore. At the head of the harbor is a wide point, really an old Mesozoic beach uncovered by the elements, on which lay scattered ammonites, *Inoceramus* and other fossils of that ancient time. Nothing could be seen of the peak from this point, but beyond it was a small rocky bay from which we learned hunters had a trail up to the flanks of the volcano where they went for bears.

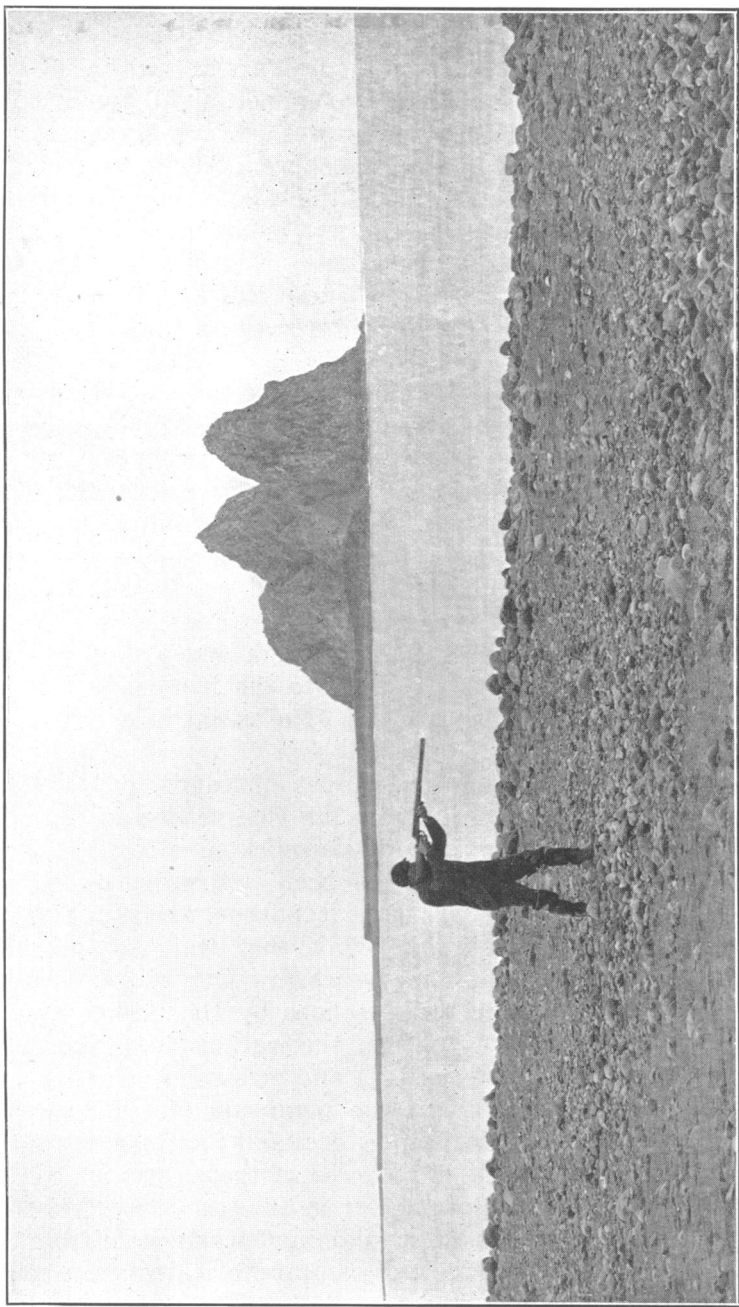
Only from the opposite side of the inlet can a good view be had of the beautiful snowwhite cone, 12,066 feet high, as measured by the Russians. It has never been ascended, and on numerous occasions has been recorded as active. On the occasion of my last visit in 1899, the spruce forest on the opposite shore of the Kenai peninsula, for many square miles, had been killed by the masses of ashes which had proceeded from an eruption which had occurred since my previous visit.

The Redoubt volcano, 11,270 feet high and a very similar cone, is situated about thirty miles to the north and east of Iliamna and has a similar history. No ascent of it is known to me.

In the southwest corner of the inlet off Kamishak Bay rises the brown cone of St. Augustine or Chernabura, the latter name meaning "black fox," a Russian nickname for the black-cowled Austin friars. This has been active within recent years. Formerly there was a boat harbor where the Aleut otter-hunters left their kayaks while they watched for their prey from the cliffs, but some years previous to our visit of 1895, when the mountain was ascended by Dr. Becker, an explosion which broke away part of the wall of the crater filled the harbor with fragments of lava and masses of ashes.

Further to the southwest the peninsula is studded with peaks some of which are volcanic; Alai and Chiginagak are the most prominent, but little is recorded of them.

While surveying in Port Moller in 1874 for the Coast Survey, the western edge of Mt. Veniaminoff was visible from the sea with intermittent clouds of steam and blackish smoke puffing from the invisible crater at intervals. This locality I found one of the most fascinating for a geologist. The volcano in the distance, the abrupt slope toward the Pacific, the long slope toward Bering Sea, as in all the peninsular region;

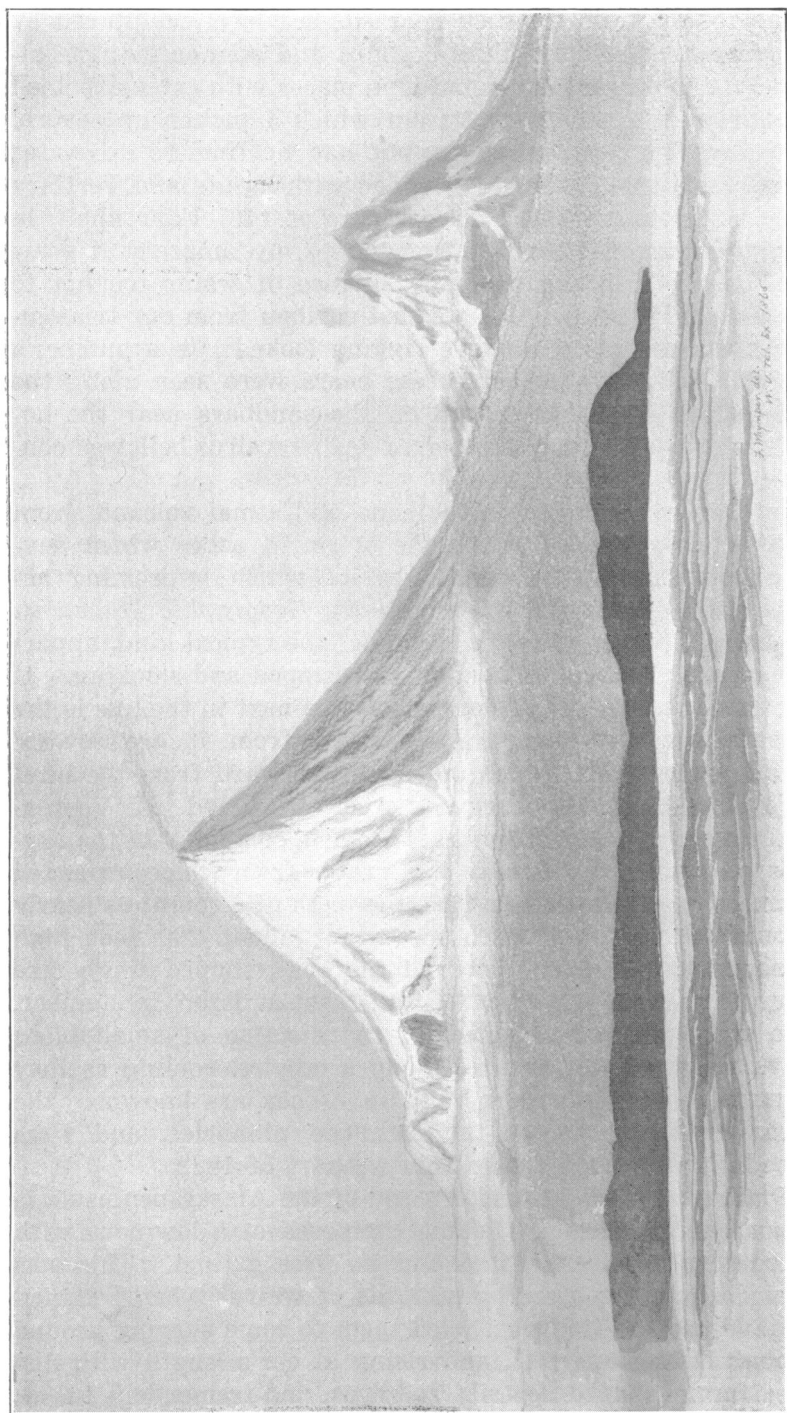


BOGOSLOFF ISLAND, massive eruption, from the beach of the new island, Grewingk, three miles N.N.E., August, 1895.

great slabs of Mesozoic rock near the sea level sculptured by the presence of elegant fossil scallops and ammonites; the alluvium of the beaches surmounted in places with extensive shell heaps of prehistoric people, from which I picked up several interesting archeological relics, but had no time to excavate; and on a small flat point interbedded with lignite and Tertiary shales, hot springs with a temperature of 140° Fahrenheit, in which were large leathery algæ and to my amazement some water beetles skipping over the surface of water too hot to bear the hand in. Here too we shot caribou from our triangulation stations till our vessel's rigging looked like a butcher's shop with the hanging carcasses; bears were seen along the shore fishing for salmon; and on the sandbars near the entrance of the bay a herd of red-eyed yellow walrus bellowed continually.

Further westward rises the cone of Katmai volcano, from which a few years ago came the storm of ashes which devastated the island of Kadiak, and of which interesting accounts have appeared in the *National Geographic Magazine*. It is, or was, when I saw it, a cone of the typical kind, apparently about 5,000 feet in height, snowcapped and smoking. It had not been ascended at that time. The next in the line is the quiescent Pavloff volcano. Westward from it are several others apparently volcanic, and northwestward from the head of Volcano Bay, we observed, when becalmed off Vosnesenski Island in 1880, a remarkable phenomenon. On the skyline was apparently the edge of a crater from which projected upward a series of pinnacles like the teeth of a comb; as nearly as could be measured with a sextant about 200 feet high and about 40 feet in diameter at the base, shaped singly like a very tall champagne bottle, and over a dozen in number. These were probably formed by the ejection of small blobs of lava from small apertures along a crevice, cooling as they fell, until the pinnacle was built up. They are known to the natives by the name of the Aghileen pinnacles, and were mapped by me on the Coast Survey chart of 1882.

Northwest from the western end of the Alaska peninsula is the small volcanic Amak Island, composed of a low cone with the crater nearly obliterated and its fires extinct. This was occupied along the shore by myriads of walrus when I visited it in 1868, and their curiosity led them to come surging around our boat, diving under it, and rising at oar's length with distended funnel-shaped nostrils, red eyes, and tremendous tusks; a situation we found disconcerting, though they offered no violence.



PEAKS OF SHISHALDIN AND ISANOTSKI LOOMING ABOVE THE FOG ON UNIMAK ISLAND, about thirty miles distant from a point south of Unimak; from a sketch made on shipboard in 1885, by Frederick Whymper.

The island of Unimak off the end of the peninsula is perhaps the most volcanic of the larger Aleutians. The voyager to the islands *via* Unimak Pass is apt to make as his first land-fall, the magnificent cone of Shishaldin rising above the banks of fog. Many times as I have seen it, I never fail to be impressed by its sublimity. If the weather be favorable, one may see by its side the lower black contorted mass of Isanotski, all that is left from a tremendous explosion of the early part of the last century. Its shattered bulk and frowning black crags form an extraordinary contrast with the tall pure white cone of Shishaldin. The latter rises nearly 9,000 feet, to the 5,525 of Isanotski. The third volcano of prominence on the island is Pagromnaia, or the Thunderer, a broad dome of about the same height as Isanotski but with very gentle smooth sloping sides, and near the shore. Shishaldin steams gently from a point slightly below the apex. It is some twenty miles inland over rough lava beds. It has never been ascended. In the *Bulletin* of the Société de Géographie for December, 1873, p. 568, an account of a supposed ascent of this mountain is given by a traveller in these regions in 1871. He was accompanied only by some natives of Unalashka who I was careful to interview on their return to Iliuliuk, and they assured me that the mountain ascended was Pagromnaia and not Shishaldin, and that the party did not approach within many miles of the latter mountain. This shows how careful one should be in identifying one's mountain.

The next large volcano to the westward is the crater of Akutan on the island of the same name. It is low, probably not over 4,000 feet at any point, and is said to have a smaller cone and crater within the larger one. It is constantly active, and frequently at Unalashka I have heard loud reports sometimes kept up for hours at regular intervals, which were said to be the work of Akutan. Once I timed them and found the intervals about eight minutes long. It sounded like distant discharges of heavy coast artillery.

On the island of Unalashka is the volcano Makushin, which is inactive. It has been ascended by Davidson in 1867 and by many others. Even the crater has been the object of a mining claim for the deposits of sulphur existing there. This mountain is reached from Makushin Bay west of Iliuliuk, by a trail between the two villages, over the center of the island. An amusing story is connected with this trail. The company leasing the seal islands, to haul seal skins from the killing grounds of St. Paul island, brought up some mules by a vessel which touched at Unalashka after a long and rough passage. The

mules were put ashore to recuperate and one wandered up the trail. Two Aleuts (who had never seen any land animal bigger than a sheep) were coming over to Iliuliuk. At the ridge of the island they met the mule, who, possibly rejoiced at the sight of a human being, lifted up his voice mightily. The cliffs re-echoed it. The Aleuts believed it was his Satanic Majesty, fell on their knees and prayed audibly. It was perhaps the first instance of a mule promoting prayer!

At the northwest head of Captains' Bay is a small, extinct, but beautifully preserved, volcano about 3,000 feet high. While making my survey of the bay, I ascended it, in 1874. The crater was complete; the portion near the walls full of black contorted columns of lava, recalling the trees in Doré's illustrations of Dante's *Inferno*. At the bottom was a little lake, and a small gray fox trotted among the spiky tongues of lava. This is named the Pistriakoff peak, from the puffins (*Pistriaki*) which nest in its walls.

I will pass over with bare mention the most interesting oceanic volcanos or rather massive eruptions, Bogosloff (St. John the Theologian) and Grewingk. Their history has been fully elucidated by Dr. C. Hart Merriam in the report of the Harriman Alaska Expedition. These masses are thrust up out of deep water. Coming down from the Arctic in the Coast Survey schooner *Yukon*, in October, 1880, we met terrible weather in Bering Sea. For sixteen days we were buffeted by living gales, with brief windless intervals which the heavy sea rendered still worse. We crept up in the fog to the entrance of Captain's Bay, but were swept by the currents to the westward and had to put to sea again, all hands worn out by the constant buffeting. In the middle of the night the watch, who had not been told of Bogosloff, was shocked to see the black mass rise out of the fog only a few cables' length away, and the men became very nervous. We decided to run for shelter as soon as it was light, trying for Chernoffski Harbor. Our only chart was dated 1795, and among the numerous rocky bays we had to find Chernoffski entrance, the only safe harbor, or come to grief. With dawn the fog cleared, the gale still blowing from the northeast. We took departure from Bogosloff under a goosewinged foresail alone, and all hands were on deck. To the westward rose the bluff end of Umnak, with a long reef stretching toward us, over which the great combers rushed in a sweep of foam, striking the foot of the cliff with a noise like thunder, and mounting two hundred feet to its very verge. It was a sight to make any seaman's blood run cold. While watching it, the fog above parted for a few moments and we saw

the snowy cone of the Vsevidoff volcano, on Umnak island, resting on the clouds, the image of perfect peace.

We made Chernoffski safely and later found that, on the old Russian map, the position of Bogosloff had been fixed from Chernoffski, so our course had been the correct one; but on the modern maps the position of the volcano was about 30 miles in error, so that we were in good fortune to have used the ancient survey to lay our course. The glimpse of Vsevidoff at such a dramatic moment was the only one had in many voyages. Usually the mountain hides its whiteness under an impenetrable mantle of fog. The Russians regarded it as less high than Makushin, but little is really known of it. I may add that only from a considerable distance at sea is the apex of Makushin differentiated from the non-volcanic peaks with which it is associated.

On the island of Umnak there are four volcanic vents beside Vsevidoff. Of these Tuliskoi on the north and the River volcano (Riecheshnoi) on the western end of the island are the most noted, but none rises to any considerable height, practically nothing is known of them and no ascents of either are on record.

Beyond Umnak lie the Islands of the Four Craters (Chetirisopochnoi). Little is known of them, except that in the hot, dry, solfataric cave of one of them was the mausoleum of which the romantic story is told in the Smithsonian Contributions to Knowledge;⁶ while the mummies themselves form part of the collection of the U. S. National Museum.

To the westward again volcanic vents are numerous but hardly known, until we come to the island of Atka, where, on its northern projection, is situated the nearly extinct vent of Korovin, about 5,000 feet in height. Around it are grouped several lesser cones, Sarycheff, Sergieff, Konia, and the volcano of the Springs (Klucheffskaia). With my assistant Marcus Baker I visited the latter in August, 1873. The springs are situated high up on the flank of the peak and the Russians formerly maintained a rude sanitarium here for rheumatic and skin diseases. The water I found to have a temperature of 164° F., and it contains sulphur, lime and alum in solution. The water issues as small geysers and deposits a clay-like material of varied and brilliant colors, red, brown, yellow, light blue, and various shades of gray. The natives utilize this material to color the walls of their houses, and it was said to be reasonably permanent. The amount of water is not great and the natives stated that it had perceptibly diminished within living memory. The springs are on a bench or plateau, about

⁶ No. 318, pp. 40, pl. 10, 1898, 4°.

five miles from Korovin Bay, and reached from the head of an inlet making up from the old harbor, and into which a rather large stream discharges.

West of Atka a volcano called the White Peak is said to exist on Adakh Island, but we saw nothing of it. A series of sextant angles on the north peak of Tanaga Island, said to be volcanic, gave a height of 7,108 feet, and, to the southwest, the wholly volcanic island of Garéloi (Burnt Island) about 5,500 feet, but these measurements were dependent on positions which may be incorrect, and the peaks may be higher. Grewingk from Russian sources gave them a much greater height. Off these islands, in a thick fog on our return voyage we heard for hours a series of heavy reports, like the discharges of great guns, and the Russians have reported violent activity among them during the last century.

The last active volcanos of the Aleutian chain of which we have knowledge are found on the Island of Seven Craters (Semisopochnoi) where more or less eruptive action was reported to be continuous in 1873. We caught only glimpses of the island when the prevalent fog lifted. Beyond this on the island of Little Kyska, at the entrance of the fine harbor surveyed by me in 1873, is a magnificent wall of tall slender vertical basaltic columns, like the pipes of an immense organ, which yields nothing in impressiveness to Staffa or Stromboli.

Westward of the Seven Craters the islands are composed chiefly of clay porphyry or schistose rocks, as far as observed, and there is no record of volcanic action. Northward in Bering Sea the Pribiloff Islands are wholly volcanic. On St. Paul, Miocene sandstones are included in the rock torn from the sea bottom, and contain numerous fossils.⁷ When we reach Norton Sound, the islands of St. Michael and Stuart are composed of basaltic outflows, but no vent is visible in the low dome-like hills in the interior. A part of the mainland coast opposite these islands is of the same character.

Pinnacle Island, on the southeast corner of St. Mathew Island in Bering Sea, is believed to be similar in origin to Bogosloff. It has a deep gash running longitudinally through its crest, and in this fissure we thought, in 1880, we saw at night a glow as of a fire; but this may have been illusive.

In the Yukon region and northward, I know of no volcanic vents or lavas reported, but in the line of the Aleutian chain the field for the vulcanologist seems unparalleled. Even the great arc of the Japanese archipelago can offer less of interest in the form of volcanic activity.

⁷ See "Fur Seals and Fur Seal Islands of the North Pacific Ocean," Part III., 1899, Gov't Printing Office, Washington, D. C., p. 539, *et seq.*